

PATENT SPECIFICATION

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COMPLETE SPECIFICATION.

New or Improved Materials for Enhancing the Growth and Improving the Quality of Plants.

I, SARAH HEYL, a British Subject, of Partingdale Lodge, Partingdale Lane, Mill Hill, London, N.W.7, do hereby declare the invention, for which I pray that a patent may be granted to me, and the method by which it is to be performed, to be particularly described in and by the following statement :

This invention relates to materials for enhancing the growth and increasing the quality and pest-resistance of plants, crops or other vegetable growth and, in particular, relates to materials of the kind wherein there is provided an alkaline mixture of a plurality of water-soluble mineral double salts and an adhesive carrier.

Hereinafter the word "plants" will be used to denote all plant life, but chiefly those plants appertaining to agriculture and horticulture.

According to this invention, there is provided a material for enhancing plant growth and/or quality and/or pest resistance comprising an alkaline mixture of a plurality of water-soluble mineral double salts, commercial alginate and colchicine.

Commercial alginate may be prepared as a brownish powder from seaweed and, in particular, from many of the larger brown seaweeds, and the said powder may be mixed with water to form a viscous fluid consisting mainly of crude sodium alginate. The other constituents of the commercial alginate include inorganic substances such as iodine, bromide, potash, common salt and combined nitrogen and phosphate, in addition to organic constituents. The soluble constituents of the commercial alginate can be absorbed by plants, greatly enhancing their growth and quality, whilst the glutinous nature of the alginate when made up into a viscous fluid enables it to be used as an adhesive carrier to bind together the ingre-

dients of the said material and prevents the soluble ingredients from being washed away from the seeds, tubers, roots or the like to the subsoil ; the plant thus has sufficient time in which to absorb the said ingredients.

Furthermore, the commercial alginate serves as a culture medium for bacteria and thus promotes the enzymic action by means of which the soluble ingredients of the material are transferred to the plant sap. By reason of its glutinous nature, the said commercial alginate also has a deleterious effect on the larvæ or eggs of pests in the soil.

Colchicine is the alkaloid yielded by colchicum autumnale or meadow saffron.

When absorbed by plants, it influences mitosis and tissue metabolism. In addition to enhancing the growth and quality of plants, it furnishes a certain amount of protection against destructive animals since it is a poison. Colchicine is very powerful and only a small amount is required ; if too much is included in the material of the invention it tends to harden the roots of a plant being treated with the material.

Preferably, the material includes between .0002% and .0005% of its own weight of colchicine and between 0.5 and 1.5% of its own weight of commercial alginate.

The material may include rubber or latex, such as rubber latex or the latex of gutta percha or guayule, as a water-insoluble adhesive carrier. However, latex should preferably not be used when the material will be subjected in use to low temperatures since, under these conditions of temperature, latex would coagulate. Commercial alginate does not suffer from this disadvantage and can be exposed to weather conditions without coagulation resulting. The material conveniently includes between 0.5% and 1.5% by weight of latex where this is present.

[Price 3s. 6d.]

Price 4s 6d

According to a further feature of the invention, the mixture may also include soft soap.

When soft soap is absorbed by plants, the sap is rendered alkaline. This is especially advantageous in the growing of plants for human consumption for not only does it improve the flavour of the plants but, in addition, it is distasteful and even destructive to those insects that depend for their existence on an acid sap.

If desired, additional or alternative vermicides, insecticides, larvicides, fungicides, parasiticides and the like may be included in the material. Thus according to a still further feature of the invention, Derris may be included in the material in order to minimise any trouble from greenfly and any other small insects such as white fly, red fly and mealy-bug.

The optional ingredients of the material according to the invention are preferably chosen so as to suit the particular plant that is to be treated.

Thus Derris which is absorbed into a plant would not be used for plants intended for human consumption, since, having poisonous characteristics, it might prove harmful.

According to this invention therefore special materials would be made up for special purposes, e.g. one type of material would be made up which would be particularly suitable for treating tomato plants, and another for lettuces and other plants used in salads.

A wide range of water-soluble mineral double salts is preferably used in the material, a plant that is treated with the said material selecting and assimilating those ingredients which are most suitable to its physiological requirements for the production of its healthy growth. Preferably such double salts are ammonium phosphates of metals and comprise, for example, sodium ammonium phosphate, zinc ammonium phosphate, magnesium ammonium phosphate and ferric ammonium phosphate.

The material is useful for the treatment of grain against smut and blight, being preferable to the dangerous mercury treatment used at present, and the material is also useful for the treatment of potatoes against smut and blight.

The absorption of the water-soluble components of the material takes place below the surface of the soil and it is therefore preferred to supply the material to the seeds, tubers, roots or the like by coating them with the material, the commercial alginate of the material permitting ready adhesion. By this method, any given seed, tuber or root may be coated with the material and despatched, coated and ready for planting, to the purchaser.

Moreover it has been found that, in the case of seeds, this coating actually preserves the germinating power of the seed as it retains the inherent moisture in the seed and also protects the seed from rotting due to excess moisture in rainy weather.

Alternatively, of course, the said material can be supplied to the plant grower who can then coat the seeds, tubers, roots or the like with the material before planting as and when required.

If desired, material of the invention in a viscous form may be applied to the soil in the vicinity of the seeds, tubers, or roots to be treated by loosening the soil and mixing, mulching or spraying it with the viscous material. For this purpose, the material may be mixed with water. This method of application has the advantage of having a deleterious effect, by reason of the glutinous nature of the material, on the larvæ or eggs of pests, in the soil.

Alternatively the said material may be allowed to dry to form small pellets or particles which can be placed, for example by drilling or trenching, in the soil adjacent to where the seeds, tubers, roots or the like are or will be. Such conversion of the material into small pellets or particles may be effected by freezing and grinding, or in a pill-making machine.

In a preferred example a material is provided containing the following ingredients, the parts being given by weight :—

$\frac{1}{4}$ to $2\frac{1}{2}$ parts commercial alginate	100
$\frac{1}{4}$ to $2\frac{1}{2}$ parts rubber latex	
50 to 89 parts softened water	
1 to 25 parts potassium diphosphate	
1 to 25 parts ammonium nitrate (or 3 times the same amount of sodium nitrate.	
1 to 25 parts each consisting of 1 part sodium ammonium phosphate and 1 part comprising each of the following mineral salts :—	105
Sodium ammonium phosphate	
Manganese ammonium phosphate	110
Zinc ammonium phosphate	
Copper ammonium phosphate	
Ferric ammonium phosphate	
Potassium ammonium phosphate	
Lithium ammonium phosphate	115
Magnesium ammonium phosphate	
Borax	
Potassium iodide	
A soluble cobalt salt	
Potassium phosphate	120
Ammonium nitrate and/or sodium nitrate	
A soluble double salt of silicon and ammonia or a salt of nickel, selenium, fluorine or sulphur.	125
.0001 to .0004 parts (i.e. approximately 0.1 gms. to 100 lbs. of the materials)	
Colchicine	
Soft soap.	

According to this invention the ingredients set out above are made up into the material as follows :—

5 The mineral double salts are dissolved in boiling water, such water conveniently being a natural mineral water or a water from a mineral spring containing in solution such elements as for example, sodium, magnesium, potassium, sulphur, iron, iodine, boron, 10 lithium, copper, zinc and manganese; examples of such waters are Aachen and Vichy waters. When the double salts have been thoroughly dissolved, the solution is allowed to boil for a few minutes. When the 15 solution has cooled to a blood heat temperature, i.e. approximately 98° F., cold commercial alginate is added, followed by the rubber latex, soft soap and colchicine.

20 According to the quantity of water used the material may be in the form of a viscous liquid, which may be sprayed on to the soil in the vicinity of the seeds, tubers or roots to be treated as hereinbefore described or, if only a small quantity of water is used, the 25 sticky material may be coated on to the seed, tuber or the like.

In experiments, such a material was applied to the roots of clover, and good quality clover was grown to a height of four 30 feet. This growth in one season would enable farmers to make four good cuttings instead of the usual one.

The growth, quality and pest-resistance of other plants, such as tomato plants, were 35 also found to be improved by applying the said material to the roots, by watering the bed with a mixture of 1 part of the said material in 10 parts of water.

40 It should be understood of course that other ingredients may be added to the material made according to this invention.

Thus, in order to enhance the promotion of the enzymatic action by means of which the soluble ingredients of the material are 45 transferred to the plant sap, the adhesive carrier may also incorporate a filler or fillers such as kieselguhr, anti-acid materials such as carbonate of lime, nitrogenous materials such as sterilized leather or leather powder 50 from which glue and gelatine have been extracted and the fats removed (e.g. by cracking them by means of steam), ground paper, other organic materials such as humus, stable manure, green or vegetable 55 matter, hop manure or guano impregnated with gum, wax, sap or resin emulsions, and waxes such as beeswax, carnauba wax, Japanese waxes, paraffin wax, ceresine and crude oxokerite.

60 The material may also include natural growth substances such as yeast and maize oil, and synthetic compounds active in growth promotion such as indole acetic acid and naphthyl acetic acids.

65 Furthermore, certain radio-active salts

may be incorporated in the material to increase the rapidity of the action.

Varying combinations of these fillers and other ingredients may be used, but it is desirable that the final material is so composed that the plant is able to find, by natural selection, those ingredients which are most suitable to propagate its growth and crop and is suited to the particular soil and conditions, e.g. of temperature, in which 75 cultivation takes place.

What I claim is :—

1. A material for enhancing plant growth and/or quality, comprising an alkaline mixture of a plurality of water-soluble mineral double salts, commercial alginate and colchicine. 80

2. A material for enhancing plant growth and/or quality, comprising an alkaline mixture of a plurality of water-soluble mineral double salts, commercial alginate and between 0.0002% and 0.0005% by weight of colchicine. 85

3. A material according to Claim 1 or 2, comprising between 0.5 and 1.5% by weight of the said commercial alginate. 90

4. A material according to Claim 1, 2 or 3 and including soft soap.

5. A material according to any of the preceding claims and including Derris.

6. A material according to any of the preceding claims, wherein latex is included as a water-insoluble adhesive carrier. 95

7. A material according to Claim 6, comprising between 0.5 and 1.5% by weight of the said latex. 100

8. A material according to any of the preceding claims, wherein the said double salts are ammonium phosphates of metals.

9. A material according to Claim 8, wherein the said double salts comprise some 105 or all of the following :—

Sodium ammonium phosphate :

Manganese ammonium phosphate

Zinc ammonium phosphate

Copper ammonium phosphate 110

Ferric ammonium phosphate

Potassium ammonium phosphate

Lithium ammonium phosphate

Magnesium ammonium phosphate.

10. A material according to any of the preceding claims, wherein the material also contains salts of one or more of the following elements :—

Boron, iodine, cobalt, silicon, fluorine, nickel, selenium, sulphur. 120

11. A material according to Claim 10, wherein the material contains one or more of the following ingredients :—

Potassium iodide

A soluble cobalt salt 125

Potassium phosphate

Ammonium nitrate and/or sodium nitrate

A soluble fluoride

A soluble double salt of silicon and ammonia. 130

12. A material according to any of the preceding claims, including a mineral water or mineral waters, with or without ordinary water, or a solution of salts obtained from natural springs.
13. A material for enhancing plant growth and/or quality, having the composition set forth in the particular example hereinbefore described.
14. A material for enhancing plant growth and/or quality, substantially as hereinbefore described.

15. Plant seeds, tubers, roots or the like, when coated with material as hereinbefore described.

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FORRESTER, KETLEY & CO.,
Chartered Patent Agents,
Jessel Chambers,
88, 90 Chancery Lane, London, W.C.2,
and
Central House,
75 New Street, Birmingham 2.
Agents for the Applicant.

PROVISIONAL SPECIFICATION.

New or Improved Materials for Enhancing the Growth and Improving the Quality of Plants.

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This invention relates to materials for enhancing the growth and increasing the quality and pest-resistance of plants, crops or other vegetable growth and, in particular relates to materials of the kind wherein there is provided an alkaline mixture of a plurality of water-soluble mineral double salts and a water-insoluble adhesive carrier.

Hereinafter the word "plants" will be used to denote all plant life, but chiefly those plants appertaining to agriculture and horticulture.

According to this invention, there is provided a material of the kind referred to in which the adhesive carrier comprises R.M. or commercial alginate.

The water-insoluble adhesive carrier may include rubber or rubber latex.

According to a further feature of the invention, the said material may include colchicine and/or *sapo molle* (that is, soft soap).

R.M. or commercial alginate, which is prepared from seaweed and, in particular, from many of the larger brown seaweeds, is a brown, viscous fluid consisting mainly of crude sodium alginate. The other constituents include inorganic substances such as iodine, bromine, potash, common salt and combined nitrogen and phosphate, in addition to organic constituents. The soluble constituents of the R.M. or commercial alginate can be absorbed by plants greatly enhancing their growth and quality, whilst the stickiness of the R.M. or commercial alginate serves as the adhesive carrier and binds together the ingredients of the said material.

Furthermore, the R.M. or commercial alginate serves as a culture medium for bacteria and thus promotes the enzymic

action by means of which the soluble ingredients of the material are transferred to the plant sap. The said R.M. or commercial alginate also has a deleterious effect on the larvae or eggs of pests in the soil by reason of its stickiness.

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Colchicine is the alkaloid yielded by *colchicum autumnale* or meadow saffron. When absorbed by plants, it influences mitosis and tissue metabolism. In addition to enhancing the growth and quality of plants, it furnishes a certain amount of protection against destructive animals since it is a poison.

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When *sapo molle* (that is, soft soap), is absorbed by plants, the sap is rendered alkaline. This is especially advantageous in the growing of plants for human consumption for not only does it improve the flavour of the plants but, in addition, it is distasteful and even destructive to those insects that depend for their existence on an acid sap.

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The absorption of the water-soluble components of the material takes place below the surface of the soil and it is therefore preferred to supply the material to the seeds, tubers, roots or the like by coating them with the material, the R.M. or commercial alginate permitting ready adhesion. By this method, any given seed, tuber or root may be coated with the material and despatched, coated and ready for planting, to the purchaser.

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Moreover it has been found that, in the case of seeds, this coating actually preserves the germinating power of the seed as it retains the inherent moisture in the seed and also protects the seed from rotting due to excess moisture in rainy weather.

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Alternatively, of course, the said material can be supplied to the plant grower who can then coat the seeds, tubers, roots or the like with the material before planting as and when required.

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Alternatively the said material may be allowed to dry to form small pellets or

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particles which can be placed in the soil adjacent to where the seeds, tubers, roots or the like are or will be, for example by drilling or trenching.

- 5 In a preferred example, the material contains R.M. or commercial alginate combined with iodine as a double salt, colchicine and sapo molle, together with other water-soluble mineral double salts. The material is
10 widely applicable as the plant selects and assimilates those components which are most suitable to its physiological requirements for the production of its healthy growth.
15 In experiments, such a material was applied to the roots of clover, and good quality clover was grown to a height of four feet. This growth in one season would enable farmers to make four good cuttings
20 instead of the usual one.

The growth, quality and pest-resistance of other plants, such as tomato plants, was also found to be improved by applying the said material to the roots.

- 25 It should be understood of course that other ingredients may be added to the material made according to this invention.

- Thus, in order to enhance the promotion of the enzymatic action by means of which
30 the soluble ingredients of the material are transferred to the plant sap, the adhesive carrier may also incorporate a filler or fillers such as kieselguhr, anti-acid materials such as carbonate of lime, nitrogenous ma-

terials such as sterilized leather or leather powder from which glue and gelatine have been extracted and the fats removed (e.g. by cracking them by means of steam), ground paper, other organic materials such as humus, stable manure, green or vegetable
40 matter, hop manure or guano impregnated with gum, wax, sap or resin emulsions.

The material may also include natural growth substances such as yeast and maize oil, and synthetic compounds active in
45 growth promotion such as indole acetic acid and naphthyl acetic acids.

Furthermore, certain radio-active salts may be incorporated in the material to increase the rapidity of the action.
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Varying combinations of these fillers and other ingredients may be used, but it is desirable that the final material is so composed that the plant is able to find, by natural selection, those ingredients which
55 are the most suitable to propagate its growth and crop and is suited to the particular soil in which cultivation takes place.

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